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EAST EUROPE REPORT SCIENTIFIC AFFAIRS

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ALBANIA

GREATER USE OF NUCLEAR MEASUREMENT, CONTROL DEVICES URGED

Tirana ZERI I POPULLIT in Albanian 20 Nov 82 p 3

[Article by Alqi Kasneci, from the Institute of Nuclear Physics: "Nuclear Methods in Technological Control"]

[Excerpts] Various methods, such as electrical, pneumatic and others, are used in the automation of technological processes. These methods are used widely in our industry. In addition, nuclear methods of technological control are being used in modern-day industry.

With the aid of nuclear apparatuses, the measurement of parameters and the control of processes are carried out without any need for direct contact with the material being examined. The measuring process is not affected by environmental conditions such as temperature and pressure; the response is quick and accurate and the operation of these devices is reliable. Nevertheless, the use of these apparatuses in industry should be based on the proper criteria. There are many processes in which conventional methods and not nuclear methods should be used in automation. But also, there are a number of large industrial processes where conventional methods cannot be used or their results would leave much to be desired. It is in these cases that nuclear technological control devices should be used.

Nuclear control apparatuses are being used in our industry. In some cases, these apparatuses have been handled improperly and are no longer in use. This was the situation with the nuclear thickness measurer in the Lushnje plastics factory, which measures and preserves the thickness of plastic layers in established limits.

In the electronics sector of the Nuclear Physics Institute, work is in process for the design and utilization, under industrial conditions, or prototypes of nuclear technological control devices. For several years, a nuclear density meter has been used for the continuing measurement and recording of the density of solubility of sugar in the Maliq sugar combine. Also, we can mention the device to measure the level of liquid gas containers, the device counting objects moved by conveyer belts, the device to measure the thickness of the steel sides of various reservoirs, etc. Gradually, efforts are being made to design prototypes of nuclear apparatuses for the automatic control of industrial processes. The achievement of these prototypes, the production of corresponding apparatuses and their use in industry will be accompanied by an increase in production yields and quality, in those lines in which they will be installed.

In the paper industry, it is impossible to keep the thickness of the paper unchanged without the use of nuclear measurers of thickness. A nuclear device for measuring the thickness of galvanized steel, which was built recently in the institute is valuable not only because it gives responses in less than 2 minutes in regard to the thickness of various types of steel but also and primarily because it eliminates empiricism in this kind of measuring, which also happens in fuel reservoirs where backward methods are used.

There are many examples of situations in which nuclear technological control apparatuses can be of assistance. Therefore we think that this work which began in the Institute of Nuclear Physics should be further expanded. But this requires a great effort, beginning with the identification of those processes in our industry where measurement and control should be executed with these apparatuses, continuing on to the construction of prototypes in the institute and their production by our industry. This will also require very close collaboration between institutions and ministries.

CSO: 2102/1

CZECHOSLOVAKIA

RUMORS ON TAINTED MEAT, MILK SALES DENIED

Where Is Truth

Prague RUDE PRAVO in Czech 16 Nov 82 p 3

[Article by Marcela Vanorna: "Are some Kinds of Meat to Be Considered a Health Hazard?"; Portions within slantlines in boldface]

[Text] /It is difficult to explain the reason for the recent occurrence of various rumors and "definitely true information" which--at best--endanger the reputation of our food products, and needlessly unsettle the shoppers. One group of these rumors is based on "chemistry," plenty of which is allegedly everywhere, so that meat, milk, etc. are hygienically defective. Another rumor again describes most various animal diseases as a source of danger for people consuming meat./

In the present world, there is indeed a lot of "chemistry" around us. For example, we inhale lead compounds in the form of exhaust gases from automobiles, knowing that they are carcinogens; smokers take into their lungs tar and nicotine with the same effects; no doubt detrimental is also the addiction--in greater extent--to the chemical substance ethanol which is consumed in the form of alcoholic beverages. Everybody is aware also of the consequences of chemistry supplied to the body by an overdosage of medications, especially if people decide about their use by themselves. Chemical detergents for washing dishes are in daily use, and enough families could be found where the dishes are then not even rinsed in clean water.

It would be very comfortable--if not wise--to lay the blame of the detrimental effects of overchemicalization which surrounds civilized man on the chemistry applied in agriculture. The future, and perhaps even the very close future, will belong most probably to the production of foodstuffs in factories with the help of various microorganisms. However, as long as the food is being produced in the fields, in stables, and on limited land funds, it is necessary to admit quite openly that today, if there should be a ban on using industrial fertilizers and other agricultural chemicals, we would be far from coping with the crops of the fields.

In connection with animal husbandry there is often talk about biofactors. These are substances of a natural character "produced" by the very living

organisms of plants and animals, such as vitamins, amino acids, enzymes, etc. Today many of them can be made by humans in the pharmaceutical industry, either in a microbiological or chemical way, and are also duly utilized. For example, they have been traditionally used for decades in human medicine. Why then, all of a sudden, should identical methods and principles be of damage in animal husbandry?

Man-made substances nonexistent in nature are also growth stimulants used in animal husbandry. Do not their residues remain in meat? This is absolutely ruled out in this country, where they are correctly applied under the responsibility of the State Veterinary Control. In many countries, however, both biofactors and veterinary drugs may be purchased by the farmers themselves according to their own judgment, and their production is in the hands of private proprietors.

In the CSSR, growth stimulants--although their supply is deplorably low--are given only to animals of lower weight categories, e.g. to hogs in fattening stations, where they reduce losses and raise increments. /However, before the animal reaches abattoir maturity, traces of these substances in meat disappear./ How do we know it? Before establishing production of these preparations they are tested until--more than 5 years--there are no doubts about the action of "chemistry" in the body of an animal, and about its cellular decomposition. And not only that. It is tested, e.g., as to whether chemical residues in with organic manure get back into the soil, then into plants, etc.

In cases where an animal fattened with help of a growth stimulant has to be slaughtered before it reaches abattoir maturity, its meat being tainted, //it is confiscated in the slaughterhouse./ The same applies to the use of some veterinary drugs.

In this country, no less care is given to testing of all other chemical preparations, e.g., substances used to preserve fodder. As it happened, recently we got a call to our editor's office from a citizen asking us to verify what kind of chemical preparation was used for silaging in one of the agricultural cooperatives [JZDs]. He depicted everything in such dark colors, that it incited us to set off for that place. There it turned out that what they used was Lactosil--a microbiological preparation which has nothing whatsoever to do with the production by means of chemical compounding of elements. Actually its effect is similar to that of the bacteria which "turns milk sour," preserving it this way, too, as a matter of fact.

It is necessary to admit openly /that so far in the use and production of biofactors we lag behind the countries with well-developed agriculture./

And what about animal diseases? The situation here is similar to that in human diseases. Some of them are disappearing because physicians have succeeded in conquering them, other diseases are appearing. Everything in the world is in constant development. In animals, just as in humans, infectious diseases pose no problem today. For example, since 1968 our

cattle breeds have been free from tuberculosis, while brucellosis was liquidated as early as in 1965. At present, cattle breeds are healing from trichophytosis (herpes ailment causing hair loss). It is a fungal disorder transferable from animals to people. In this connection, the rapid progress was corroborated by collaboration with soviet scientific teams which provided Czechoslovakia with a vaccine, later successfully improved by Bioveta. Thus today another burdensome problem has been practically solved, a problem which stumped medicine for a long time.

Leukosis of cattle may be mentioned as an example of the new diseases. It attacks highly bred and effective breeds imported to this country partly to improve our cattle. Since last year a systematic testing of cattle, especially cows, for this disorder has been established in the CSR. Afflicted heads are being excluded from breeding. This infectious disease has not been found transferable to humans by their consumption of meat or milk. /In spite of this, meat from leukotic animals, as well as that from fowl with edematous disorders, is excluded from current use./

From the economic point of view, especially as regards poultry (in this country cattle leukosis occurs only in 0.04 percent of slaughtered animals), the confiscation of meat causes certain financial losses. However, in this case the interests of the poultry industry have to step aside. In our society the health of people is of the highest priority. /After a veterinary examination, only sound poultry is cleared for sale./ Every shopper can make sure of that.

At present, the attention of the Research Institute for Veterinary Medicine is drawn to new, in many cases "old-new" ailments of poultry. For example, Mark's disease, the so-called tumidity of fowls, against which they are vaccinated today, has been known since 1907, but only during the last 10 to 15 years has it spread to a greater extent. Its cause is under investigation and so far it is known that the disorder is of viral origin. This is the first tumorous disorder against which the animal is protected by a vaccine.

Czechoslovakia can boast of a perfect system of veterinary care; 815 specialists work just in the food industry, 321 of them veterinarians, most of them in the meat industry. /Every abattoir head is examined three times./ First, in the agricultural enterprise, where a veterinarian after the examination issues a certificate stating that the animal is healthy and can be shipped to the slaughterhouse. The next examination takes place after transportation to the slaughterhouse and the third after the animal has been killed. In the slaughterhouse a veterinarian examines every head separately. He examines, as prescribed, lymph nodes and chewing muscles of a head of cattle, as well as its liver, lungs, heart, kidneys and other organs. If he finds any meat alteration, he confines the head to be slaughtered and carries out further prescribed examinations, e.g., bacteriological ones. If meat or organs display changes or do not meet the requirements, they are confiscated.

/Our veterinary service is in the hands of the state, it is unified in its organization, systematically watching and consolidating the health of animals as a prerequisite of wholesome food products./

Gastric Disorders Spreading

Prague SVOBODNE SLOVO in Czech 18 Nov 82 p 4

[Text] Prague--Yesterday the Control Committee of the Czech Board of Health Insurance dealt with present tasks, the work schedule, and the budget for next year. In connection with the spreading absenteeism due to illnesses and injuries, the committee stated that in the third trimester of this year there were almost 16,568,000 calendar days missed, and a daily average of up to 180,000 workers were absent from their working places. Since the beginning of the year the number of days missed due to illness has reached as high as 57,444,000, which is approximately by 1,438,000 calendar days more than in the corresponding period of 1981. The reason for it is above all a greater occurrence of stomach inflammations and other gastric disorders, the number of which increased by 22 percent.

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CZECHOSLOVAKIA

ENERGY-SAVING MEASURES IN AGRICULTURE OUTLINED

Bratislava EKONOMIKA POLNOHOSPODARSTVA in Slovak No 11, Nov 82 pp 487-489

[Article by Eng Juraj Hamas, SSR Ministry of Agriculture and Food:
"Systematic Efforts Toward Fuel and Energy Savings"]

[Text] The Czechoslovak Socialist Republic belongs among nations with an advanced industry, modern agricultural mass production and a high standard of living of its populace. In the coming years it will be necessary to develop and improve all indicators of the development of our society. It is a demanding role, but one that can be accomplished. One of the key problems calling for expedient solution is maximum economy in the consumption of all types of fuels and energy. After all, demands of production on fuels and energy in our country are among the highest in the world. For that reason, a part of the proposed key directions for development of the CSSR in the years 1981-1985 is reduction in the consumption of fuels and energy, specifically in the individual years of the Seventh 5-Year Plan by at least 2 percent. This task has been further reinforced by the 0.5 percent pledge we adopted during the proceedings of the 10th All-Trade Union Congress.

The problem of economizing in the consumption of fuels and energy also come to the foreground in the agricultural/food complex in Slovakia which belongs among large consumers of various types of fuels and energy. In the past two 5-year plans savings of fuels and energy, resulting from the state goal-oriented program, were monitored in our area of jurisdiction only for the sector of food production. In the years of the Fifth 5-Year Plan we met the specified quotas by more than 126 percent and in the years of the Sixth 5-Year Plan by more than 161 percent. In the years of the Sixth 5-Year Plan the demand of production on fuels and energy decreased 25.4 percent in the food industry but, on the other hand, the demand of agricultural production for fuels and energy increased 47 percent. The quotas specified for the years of the Seventh 5-Year Plan for both sectors under our jurisdiction are worked out in the state goal-oriented program 02--Economic Measures for Consumption and Utilization of All Types of Fuels and Energy.

In the immediate future, we are faced with the demanding task of significantly cutting down the consumption of fuels produced from crude oil. In the first year of the Seventh 5-Year Plan we managed to reduce consumption of petroleum for energy purposes by almost 8,000 tons and consumption of light heating oil

by more than 20,000 tons. Further reductions in consumption of petroleum for energy purposes will have to be achieved primarily by its elimination from heating. Reductions in consumption of light heating oil will be gradually implemented in three ways: innovation of agricultural drying facilities; reduced production of hot-air dried products; and gradual restriction of consumption of this fuel for generation of thermal energy and for heating. In storage and preservation of bulk fodders, priority will be given to methods less demanding on energy to replace hot-air drying. This will involve primarily production of hay, haylage and silage.

Additional significant savings of high-grade fuels can be achieved in post-harvest processing of cereals and corn. Active drying by cold or preheated air will be used to a greater extent than has been the case, be it directly by the producer, i.e., an agricultural enterprise, or also in enterprises engaged in agricultural distribution and procurement. Reaping on the stalk will be more extensively applied during harvesting and postharvest processing of corn with subsequent final drying in dryers and the experience of the Hungarian People's Republic will be used in storing. Neither of these two methods calls for drying in drying facilities using high-grade fuels.

A decisive step in reducing the consumption of heavy heating oil will be taken by implementation of the energy program of the Sugar Candies VHJ [economic production unit]. The problems of drying pressed sugar beet pulp without the use of heavy heating oil are currently being dealt with.

Economizing with fuels and energy will have to receive increased attention. Management of the fuel and energy economy in each plant or enterprise is a demanding and responsible function. After all, the person holding this post must, among other functions, provide for systematic planning of deliveries of the requisite types of fuel and energy, whereby an underestimated requisition is as big an evil as is a requisition in excess of requirements. As part of the plan, it is imperative to provide for a continuous flow of production with economic utilization of fuels and energy and constant reductions in the demand of production on fuels and energy.

Implementation of a high degree of economy and the resultant savings of fuels and energy must be worked out in the improvement programs of each production plant or enterprise. Economization programs must cover four basic areas:

- savings achieved through elimination of energy losses;
- methods for introduction of technically justified standards for consumption of fuels and energy in production;
- implementation and application of technological processes less demanding on fuels and energy;
- potential use of secondary and unconventional sources of fuel and energy.

Incentive systems for all personnel participating in fuel and energy management must be based on such worked out economization programs.

Increased attention is currently being paid to utilization of secondary and unconventional sources of fuel and energy. Of high priority even now is the problem of utilization of heat obtained through cooling of milk. Cooling systems of the Packo and ALV type, for which the STS [state tractor station] plant in the Dolne Herspice supplies heat exchangers for heating of utility water, are installed in agricultural enterprises. Per liter of milk from milking, this system makes it possible to obtain 0.54-0.66 liter of utility water heated to 50-55°C. Systems of this type are supplied and installed by the STS VHJ and the UPS [Agricultural Machinery Repair] VHJ. Favorable experiences with the use of such a system was made also by the JRD [unified agricultural cooperative] in Sladeckovce.

As of next year, the Strojsmalt VHJ will launch serial production of solar collectors in the Elektrosvit plant, in Nove Zamky. Complete systems will be supplied by the Agra plant in Prelouc. Deliveries of a complete system will include 30 square meters of solar collectors and the requisite accessories. This system will make it possible to use solar energy for heating utility water. Experience with utilization of solar collectors for heating utility water has already been made by individual agricultural cooperatives in Modrany, Vydrany, Mostova, Svobodin, Nove Zamky, Puchov, at the state farms in Hubice and Michalovce as well as the state poultry farm in Bratislava. The producer and supplier can guarantee delivery of 25,000 square meters of solar collectors in the years of the Seventh 5-Year Plan. Their utilization should save 8.7 GWA [gigawatt-hours] of electric energy.

The agricultural/food complex in Slovakia was one of the first sectors to start utilizing geothermal waters for production purposes. This energy has been used so far to heat 3.3 hectares of foliation houses and 3 hectares of hothouses as well as administrative offices. Additional potential for utilization of geothermal waters is available mainly in Kralova near Senec, Dunajska Streda, Calov, in Podhajska, Topolniky, Galanta, Tvrdosovce, Horna Poton, Cilistov, etc.

In the area of waste heat utilization, utilization of waste heat from compressor plants of the long-distance natural gas pipeline has been worked out. By the end of the Seventh 5-Year Plan it is envisioned to build 10 hectares of hothouses, specifically as follows: in Velke Kapusany, 2.5 hectares consuming 7.5 megawatt-hours; in Jablonov on Turna, 3 hectares consuming 9 megawatt-hours; in Velke Zlievce, 2 hectares consuming 6 megawatt-hours; and in Nitra-Ivanka, 2.5 hectares consuming 7.5 megawatt-hours. An additional 4 hectares are in early stages of construction. The problem currently being dealt with is year-round utilization of waste heat, mainly in low-temperature drying facilities.

Nuclear power plants represent another source of large quantities of hot water. Its utilization in agricultural production is to be examined at a test base to be built in Jaslovske Bohunice. It is to include 2 hectares of hothouses, 2 hectares of foliation facilities, 10 hectares of open heated soil, hot-water irrigation and a fish-breeding facility. Studies are also currently underway in regard to utilization of hot water from the nuclear power plant under construction in Mochovce.

In the remaining years, on a worldwide scale, in the forefront of research, development and implementation programs will be coming in bioenergy utilization from agricultural waste, specifically through anaerobic septicization. Anaerobic septicization of materials of an organic nature and animal excrements generates biogas. We aim to test its production and utilization through processing the excrement of sheep and horned cattle and poultry droppings. Our objective is to use it primarily for generation of electric energy and for drying purposes.

Initial steps are also being taken in utilization of wind energy. The first of such facilities will be tested in the current year at the JRD in Voderady.

From among devices that can affect consumption of fuels and energy, the machining sectors should expedite deliveries of heat pumps and recuperators for our sector.

The demanding tasks of the state goal-oriented program 02--Economic Measures for Consumption and Utilization of Fuels and Energy--call on our sector to save in the years of the Seventh 5-Year Plan fuels and energy in the amount of 343,000 TMF [tons of standard fuel]. This calls for maximum economy with fuels and energy along the entire axis of production and management.

8204
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CZECHOSLOVAKIA

NEW OPENCUT COAL MINING TECHNOLOGY INTRODUCED

Prague PRACE in Czech 30 Oct 82 p 4

[Article by Jiri Bulan: "A Test in the North"]

[Excerpts] We found a single large construction site. The building in the middle of it shone with newness, as did all the doors. We knocked on one with a new nameplate bearing the name of enterprise director Vladimir Peroutka.

Entry into the Story and into History

The Czechoslovak Army Opencut in Komorany is not at the top of the North Bohemian brown coal opencuts in terms of fulfillment of its extraction plan.

"We are changing over to a new process," the director explains. "We are building a mining operation unparalleled in Europe. In brief, it is a capital reconstruction while mining work continues, and it is not so easy to build and to fulfill the extraction plan at the same time."

Fifteen contractors are involved in the reconstruction, so you can imagine the chaos that reigns here. But still the planned amount of filling in and extraction must be accomplished. Millions of tons of earth must be turned over and millions of tons of coal dug out.

It must be pointed out that the modernization was begun in 1976 and everything is to be finished in 1986. Thus the changeover to the new technology is in full swing. You will no longer hear the clanking of the rail cars, for the electric trains have gradually been replaced by long-distance belt conveyors. It is not only the extraction that is being modernized; not only the miners, but the scientists, too, worried about the craters underneath the overburden dumping machine. The instability of the fill and the frequent collapses are a tough problem for the experts who file through here every day. They are determining the geomechanics of the ground--especially since to get the goal it is necessary to dig underneath Lake Drinovske as far as the foot of the Krusne Hory Mountains. Another danger related to exposing the coal reserves is fire, for the deep Konev Mine was located here; accordingly a multi-disciplinary efficiency-improvement brigade composed of the plant engineers and members of the Mine Rescue Service in Most has begun to develop a fire-extinguishing method.

Next year it is planned to increase the targets, as the director mentioned previously: "Our assignments are not small, but we must think of the future; that is why we are investing Kcs 1 billion a year. Finding new coal reserves will pay back our investment."

Research in Progress

The experts agree that by the end of the century coal will be a strategic raw material just as oil is today. This is why, while designers are considering the reconstruction of ports and the building of tankers, bold plans for land transport systems are also emerging. The Soviet Union is even testing a sort of "pneumatic message system" pipeline. The principle is the same: sending solid fuel through pipes under a vacuum. Coal liquification is also being planned; this would also simplify transportation over long distances. We are working on this task along with other CEMA countries.

But transportation is not the only thing: the critical matter will be efficient utilization of coal, and accordingly scientists are striving to find new ways of making the fullest use of it. We will be needing more and more hydrogen for synthesis, which in turn requires new gasification methods. Why not use the old deep mines as underground generators? Ideas which not long ago were utopian now seem realistic. Staff members of the Institute for Fuel Research and Utilization in Bechovice have chosen a suitable underground lenticular body at Teplicko and one in Brezno near Chomutov.

But we must also take account of the steadily worsening quality of the coal. The heat content is falling; this is true not only of coal for power production but also of coking coal. Accordingly, we must change over to new production approaches which raise its quality. The Soviet Union, West Germany and Japan are taking the path of large-volume furnaces and a charge consisting of briquets, which is not economical here, although it is difficult to utilize poor-coking coal otherwise. Our coking industry has a rich tradition, and staff members of the Institute for Fuel Research and Utilization drew on it to find a method--pelletization.

The coal is pulverized and centrifuged in drums. Water takes the place of the expensive binding agent used in briquetting. The result is small spheres which increase the bulk density of the furnace charge, thus avoiding costly compacting. Results of laboratory tests have been published, but how will it turn out in practice? Tests at the United Steel Mills [Spojene ocelarny] in Kladno have confirmed that pelletizing is the most suitable method of obtaining high-quality coke from poorer quality coal. The first facility of this type is already being prepared at the coking plant of the Jan Sverma Mine. But what about the power production coal in the North Bohemian Basin, which is not included in the fuel balance, and reserves of which are estimated at 5 billion tons, with a heat capacity of 5 to 8 MJ [megajoules]? To burn it, we will have to change over to a fluid process. This country has tested two types of fluid combustion chambers. Both types are already in production, even though they are only small units. Larger ones are still under a question mark, involving the investment; and the enterprises decline to take such a risk.

Another problem is making full use of waste. It may be used, for instance, as a fertilizer for sandy soils. Research has actually shown an increase in the yield of wheat, hops and wine grapes. By using the waste, improved by flotation, i.e., builders can decrease their use of important sand and gravel for the manufacture of cement and block.

But let us get back to coal. To be sure, its extraction, either from the depths of the earth or from opencuts, will become more difficult, and thus it will be more demanding for the miners, but also for the designers of new machines, especially large-size ones.

A Walking Giant Comes on the Scene

The view really shakes us. Between buried treetops there looms up the new hall of the future crusher shop, and then before us opens a gigantic crater. Six kilometers long, 4 kilometers wide, with a veil of mist rising from the bottom which damps the squeaking and the incomprehensible instructions from the loudspeakers, but the ether is nonetheless crisscrossed by radio waves. Everything in that 120-meter depth appears small: the machines look like children's building blocks. In the distance, under the line of the Krusne Hory a truck convoy is moving. It is the Belaz [USSR truck make] Highway: only for Tatra trucks and dump trucks. They call it the Ervenice Corridor; it will have both a highway and a railroad. Raised dump truck boxes on a high embankment look like the wings of outlandish birds. In some places there are only tufts of rust-colored goosefoot, everywhere else nothing but clayey brown. We are moving along the silvery-gray pipes within the current of the Bela River. Instead of the rush of water we hear the roar of dredgers. You can feel the moisture in the air. Beyond the black band of the opencut is Drinovske Lake. Pumps draw water from it day and night. But what sort of monster is that on the bank?

It looks like a flying saucer with a prefabricated house on top of it, and above that a steel bridge hung with a maze of cables, while below it hangs a line of excavator buckets. This is the prototype excavator: the work of the designers and assemblers of VITKOVICE. And around it is a crowd of men in overalls. Static and dynamic tests and the final preparations are underway.

Nobody there is talking to excavator operator Pavel Scholze except the foreman. "What do you expect to hear? The entire crew is practicing and the tests have all been finished, but we will see what the excavator can do when it is in the pit."

The RK-5000, the first large-size machine of a new series, is unique in Europe. Why does it look like a walking dredge? It really does walk. Each step takes it a meter. The hydraulic equipment gives the 5,000 tons surprising maneuverability, while powerful electric motors provide the force required for an output of 5,000 tons an hour during extraction. The control room can be compared to the captain's bridge of a modern transoceanic steamer. But before the giant is tested in the opencut, there is a desire that this main test, which will last 2 years, will lead to better fulfillment of the annual plan by the Czechoslovak Army Opencut. "If we weren't sure of that, we certainly would not start with it," says Pavel Scholze, chairman of the basic party organization.

CZECHOSLOVAKIA

BRIEFS

ASYNCHRONOUS MOTOR LOCOMOTIVE PRODUCTION--The Elektricke lokomotivy (Electric Locomotives) Plant, Skoda, in Plzen is building prototype of a third generation electric locomotive powered by asynchronous motors. The traction motors produce an output of 2,600 or 3,200 kW from an input of 3 kV of DC voltage. Electronic control of the motors will provide maximum traction power and a top speed of 120 km per hour. Production of the new type of locomotive is projected until the end of this century. The locomotive is expected to become a good export item. [Bratislava PRACA in Slovak 18 Jan 83 p 2]

CSO: 2402/24

PROGRESS IN GENETIC ENGINEERING OUTLINED

Warsaw SLUZBA ZDROWIA in Polish 26 Dec 82 p 6

[Article: "Genetic Engineering -- Around the World and in Poland"]

[Text] This article represents a slightly altered version of a report which was written in 1981, in response to a request from the Science Council of the minister of health and social welfare, by professor Dr W. T. Dobrzanski, a member of the Science Council, chairman of the Polish Academy of Sciences Microbiology Committee, and director of the Pharmaceutical Microbiology Institute of the Medical School in Warsaw, after consultations with several other Polish specialists.

The progress that was made in the field of molecular biology during the 1970s led to the creation and expansion of the field known as genetic engineering. This term is used to describe all of the methods and technologies which are brought to bear to find solutions to various theoretical and practical problems, also including numerous problems of medical significance. Genetic engineering has made it possible in particular to launch a thorough investigation into the structure and functioning of genes, including the genes of higher organisms, to chemically synthesize certain genes, and to bring about the permanent in vitro recombination of fragments of genetic materials (deoxyribonucleic acids or DNA) obtained from various sources (e.g., man and viruses or man and bacteria). The in vitro recombination of DNA has made it possible to engage in various deliberate forms of genetic manipulation, e.g., the introduction of a certain human gene into a bacterium and the inducement of the bacterium to biosynthesize a product of this gene or the introduction of suitably constructed genetic elements, containing fragments of a virus and certain genes, into animal cells.

These kinds of capabilities have opened up broad vistas for further research in the biological sciences, as is reflected in the rapid proliferation in all of the world's developed countries of research teams, working in university, medical, and industrial centers, which are applying the methods and technologies of genetic engineering.

Some of the principal theoretical objectives of this research work are listed below:

- The study of the structure, function, and regulatory mechanisms of genomes and specific genes of organisms occupying various levels on the evolutionary scale, including man. It should be pointed out in this regard that knowledge of the structure and function of human genes is to date very modest.
- Assessing the feasibility of modifying the functioning of individual genes or gene complexes in various organisms.
- Explaining the mechanisms by means of which certain biological phenomena occur, e.g., the transformation of cancer cells, the mechanisms of pathogenic microbes (viruses, bacteria, and fungi), or immunological mechanisms.
- Making a thorough study of the feasibility of breaking through evolutionary biological barriers (which determine the uniqueness of certain classes of living organisms), e.g., by introducing alien genes into a selected organism.
- Progress in the development of genetic engineering technologies and methods. It is the unanimous opinion of many of the world's most prominent scholars that research in the field of genetic engineering represents the dawn of a new era in theoretical biological research.

Some of the main practical objectives of this research work are as follows:

Short-term objectives:

- The fabrication of bacteria strains capable of synthesizing certain human, animal, or plant products, e.g., various kinds of antibodies, hormones, or enzymes. For example, bacteria strains have already been developed which produce insulin, human growth hormones, urokinase, and the anticancer and anti-viral agent, interferon.
- The fabrication of microorganisms strains which could be put to work in the field of environmental protection owing to their outstanding capabilities when it comes to the treatment of sewage, the decomposition of wastes, or the elimination of various kinds of contaminants from the environment (e.g., microorganism strains have already been developed which can be used to clean up oil spills in water).
- The development of entirely new kinds of biologically active products, including products of medical significance.
- The development of more productive and cheaper bioengineering processes, e.g., for the production of various medicines such as antibiotics or certain enzymes.
- Achieving progress in the control of infectious diseases in man, animals, and plants by acquiring knowledge about the mechanisms of pathogenic microbes and learning how to produce new vaccines, especially antiviral vaccines.

-- The development or refinement of certain biological processes which are used to generate energy (progress has already been made, for example, in the application of microorganisms for the production of methane and, at a much lower cost than heretofore, ethyl alcohol).

-- The automation of technologies used for the molecular analysis of certain genetic mechanisms.

Long-term objectives:

-- The discovery of new and important information which will have a bearing on the diagnosis and treatment of cancer.

-- Making progress in the diagnosis, prevention, and treatment of hereditary diseases such as metabolic disorders.

-- Finding applications for the achievements of genetic engineering in premarital counseling.

-- Finding applications for genetic engineering in the course of finding answers to immunological problems associated with organ-transplant medicine.

-- Increasing animal breeding and field crop productivity.

-- Finding a way to make it possible for certain plants, which have been rendered genetically incapable of doing so, to absorb free nitrogen, a development which would make it possible to substantially reduce the consumption of nitrogen fertilizers (intensive and advanced research concerning this problem has already been conducted elsewhere in the world).

The advances which have been made in this field of research might be attested to by the fact that as early as 1978 around 150 research programs were carried out in this field in the UK and the FRG.

The interest that industry has shown in the achievements made in the field of genetic engineering is reflected in the fact that over the past few years several specialized firms have been founded in the U.S., Canada, Japan, and Western Europe that for either medical or commercial purposes are engaging in research on the in vitro recombination of DNA. According to recent projections, bioengineering is going to represent the newest industrial growth trend between now and the year 2000 (an opinion which has been advanced, for example, by the British magazine THE ECONOMIST), and by 1990 annual sales of pharmaceuticals obtained by means of DNA recombination will be valued at more than 3 billion dollars (according to the International Resources Development Agency in the U.S.A.). The first medicines developed by means of genetic engineering in conjunction with the use of appropriate microorganism strains have already been subjected to clinical trials. For example, at clinics of the University of Texas patients suffering from certain types of cancer have already begun to be treated with bacterially synthesized interferon, and for the first time diabetes patients are being treated with bacterially synthesized insulin. It should also be pointed out that in 1981 the Congressional Office of Technology

Assessment in the U.S. advanced the opinion that in conjunction with the application of genetic engineering methods it will soon be possible to begin producing at least 48 human hormones and numerous vaccines for combating tropical infectious diseases in humans and infectious diseases in animals.

The U.S. Supreme Court recently handed down a decision permitting the patented manufacture of organisms fabricated using genetic engineering methods. The USSR is also devoting considerable attention to research in the field of genetic engineering, as is demonstrated by the substantial resources which have been dedicated to this research work.

In Poland

Viewed against the background of the rapid strides which are being made on a worldwide scale in terms of basic and applied research using genetic engineering methods, the facts on where things are going in this field in Poland have been summarized below.

Research work in this field first got started in Poland on a very modest scale and at a very late date. This research work got under way here during the last 3 or 4 years on the initiative of a few research teams made up of highly trained specialists without coordination and without any additional sources of funding being made available to these research teams.

This work is now being pursued by research teams associated with the following institutions: the Institute of Genetics at Warsaw University, the Institute of Biochemistry and Biophysics of the Polish Academy of Sciences, the Institute of Biochemistry at Gdansk University, the Institute of General Microbiology at Marie Curie-Sklodowska University in Lublin, the Institute of Chemistry of the Polish Academy of Sciences in Poznan, the Institute of Biochemistry at Lodz Medical School, the Institute of Microbiology at Warsaw University, the Institute of Pharmaceutical Microbiology at Warsaw Medical School, and the Oncology Institute in Gliwice. All of these research teams consist of small staffs (2 - 5 persons) and have to contend with enormous problems when it comes to the procurement of apparatus, lab equipment and reagents.

This state of affairs persists in spite of the fact that the Presidium of the Polish Academy of Sciences and the Science Council of the minister of health have characterized the rapid advancement of research using genetic engineering methods in Poland as a high-priority task.

Research in the field of genetic engineering in the aforementioned institutions is only in its initial stages. Under these circumstances there are two options: either we provide the resources which are needed for the further advancement of this research effort or we give up on this kind of research altogether if providing the wherewithal needed to carry on with this work proves to be impossible. Considering the major theoretical and practical importance of this research in the fields of medicine and pharmacy and Poland's serious late start in the development of this field, during the period 1981-1985, notwithstanding the country's economic situation, we should adopt a minimal program which would make it possible to carry on with work in the field of genetic engineering at least in those institutions where this research effort has already gotten under way.

This research effort should be managed on a priority basis. Assurances have to be given that the aforementioned institutions working in this field will be supplied with the equipment needed to carry on this research that is imported from capitalist countries (miscellaneous small lab equipment and reagents). The same assurances must be given when it comes to deliveries of spare parts for the imported apparatuses already obtained by these institutions. Over the next few years an effort should also be made to permit at least a slight increase in the staffing of the research teams engaged in this kind of work in order to broaden the scope of their research effort and to begin training new specialists.

It is essential that provisions should be made for the advanced training at home and abroad of personnel engaged in this kind of research work in the form of short- and long-term fellowships and attendance of specialized courses. Support also needs to be given to all forms of contacts with foreign research centers with high standards of accomplishment in the field of genetic engineering.

The fulfillment of the above conditions will make it possible to create a manpower pool nucleus for the newly emerging genetic engineering research teams in Poland.

It is important that we should move quickly and effectively to put together a research team to pursue virological research employing genetic engineering methods. There is also a clear need for the establishment of a genetic engineering research team at the Oncology Center and in pharmaceutical industry research center. However, funds will have to be appropriated in order to set up these research laboratories.

Given the country's present economic conditions, the above demands may seem to be inopportune. But if during the next few years we allow ourselves to lag too far behind in key scientific disciplines, the consequences of this neglect may persist for years to come and prevent our country from being able to harness the practical applications deriving from progress in this discipline or substantially limit our ability to do so.

Safety of Research Work Involving the Use of In Vitro Recombined DNA

From a health and environmental protection standpoint the injection of fragments of alien genetic material into cells may entail the danger of such undesirable consequences as the dispersal of active genes as part of the neoplastic transformation of cells or the synthesis by the cells of new or more highly toxic products. The danger of this happening was formerly considered to be significant. Lately, however, a vast majority of specialists in this field regard this as a minor hazard. These specialists are taking into account the development and application of certain rules governing the conduct of research work involving the use of in vitro recombinant DNA as well as the fact that over the past 10 years during which this research has been under way no dangerous incidents of this nature have ever occurred. Based on this judgment, in many countries where guidelines or laws governing safety standards in the conduct of this kind of research work are enforced such laws have been amended to allow for a considerable relaxation of the restrictions stipulated therein (e.g., in the U.S. and the UK).

Nevertheless, some guidelines and controls associated with the safe pursuit of this kind of research are necessary. This holds true for Poland as well.

Guidelines of this nature currently in force around the world encompass:

-- Demands calling for the proper training of all personnel engaged in this kind of research work.

-- Mechanical safeguards which are based, *inter alia*, on the use of safe equipment, the wearing of appropriate protective clothing, the observance of procedural rules governing the handling of the materials under study, and the conduct of experiments in suitably equipped and isolated labs. The equipment which is installed in these labs should vary depending on the nature of the experiments and the biological materials which are being used. In Poland we do not have any labs in which it would be possible to carry on a full range of research work in the field of genetic engineering. So, at least two or three labs insuring high safety standards should be built here.

-- Biological safeguards based, *inter alia*, on the precise definition of work safety standards governing the handling of various experimental systems and access to microorganism strains rated as nonhazardous. There is no chance that strains of this type will survive or spread outside the laboratory, and they are used as hosts for *in vitro* recombinated DNA.

With a view to insuring the safety of research conducted in this country in the field of genetic engineering and in response to a proposal made by the Microbiology Committee of the Polish Academy of Sciences, in 1978 the Polish Academy of Sciences formed the Task Force for genetic Engineering Methods Research Safety. This task force is made up of specialists representing the Microbiology Committee and the Biochemistry and Biophysics Committee of the Polish Academy of Sciences. Members of the task force include microbiologists, physicians, epidemiologists, geneticists, and biochemists.

These two committees of the Polish Academy of Sciences and the chairmen of five interested scientific associations published a set of guidelines in scholarly journals recommending that all planned research projects in Poland involving the use of *in vitro* recombinated DNA should be submitted to the task force for review from the standpoint of work safety. In its evaluations of such projects the task force relies on the experience of its members, their professional and academic qualifications, ethical values, and familiarity with relevant foreign legislation.

There has been no discussion in this report of the problems associated with the harnessing of some of the achievements of genetic engineering on an industrial scale. The experience of the developed countries shows that finding solutions to these problems is not easy and that this calls for appropriate technological research programs and the development of appropriate kinds of equipment, in addition to skilled bioengineers. Nevertheless, the opinions voiced by international experts are rather consistent, that is, bioengineering is going to play an increasingly larger role in the economy. And this is something which we must bear in mind.

ROMANIA

NEED FOR MORE ATTENTION TO NUCLEAR MEDICINE

Bucharest SCINTEIA in Romanian 26 Dec 82 p 2

[Article by Elena Mantu: "The Atom Is Watching Over the Health of Man--Notes on the Unit for Nuclear Medicine and Ultrasonics in Bucharest"]

[Excerpts] The Unit for Nuclear Medicine and Ultrasonic's in the Panduri Clinical Hospital, which has been in existence for 25 years, is a place where one has the feeling of complete confidence in the beneficial use of the atom.

In a small area, the laboratories which are equipped with the latest apparatus in this field make it possible to investigate, record data and obtain results which are comparable to and competitive with those of other centers for experimental and clinical research in the advanced countries. Romania is among the top eight countries in the world in regard to the peaceful use of the atom. The first nuclear medicine unit was established in Romania in 1958 in the Oncological Institute in Bucharest.

For several years, the Unit for Nuclear Medicine and Ultrasound Waves in the Panduri Clinical Hospital--headed by Tiberiu Pop, doctor of medical sciences, member of nuclear medicine societies in various countries--has been obtaining results which place us on a level with the latest developments in the field of nuclear medicine and ultrasonics, in the area of diagnosis and experimental and clinical research. Although 80 percent of the unit's activity deals with the special examinations which it provides to the population, the collective is also carrying on an intense research activity. So far, this research has taken concrete form in 350 scientific papers, published in Romania and abroad, and 7 monographs, one of which, "medicina nucleara in diagnostical clinic" [Nuclear Medicine in Clinical Diagnosis], was awarded the "V. Babes" prize of the Academy in 1979. "Tratatul de medicina nucleara" [Treatise on Nuclear Medicine] will be published next year, under the editorship of Dr. T. Pop. It will be a synthesis of 25 years of Romanian experience in nuclear medicine, in diagnosis and treatment.

In addition, the work of the specialists of this center has taken concrete form in the resolution of clinical problems, making precise diagnoses, in the cases of patients from all over the country whose diseases could not be diagnosed by conventional methods, using radiography, angiography, and even echography (in Romania the latter technique is color-computerized), which make it possible to have greater precision.

"In recent years," Dr Tiberiu Pop tells us, "I have collaborated with specialists in veterinary medicine, in my dual capacity as a doctor and a veterinarian, and with the Balotesti Research and Production Institute for Cattle Raising. Modern research in radioimmunology makes it possible to learn more about various inflammatory or non-inflammatory disturbances which could influence the fertility, birth rate and growth of various species of livestock. The methods of nuclear medicine can help us to learn about the inner workings of some functions and, therefore, will increase the possibilities of influencing the birth rate and fertility in species of great economic interest."

"Compared with the results obtained in medical practice and in research activity, we believe that there are certain deficiencies in higher education in regard to the training of specialists in this field or in the teaching of the basic elements needed for an understanding of new phenomena and methods of investigation and treatment."

"Nuclear medicine should receive attention in the field of higher education; courses or a discipline or, at least, a specialization in this very modern field should be initiated. Otherwise, students and even doctors or other specialists will learn about scintigrams, diagnosis by ultrasonics and other important methods by means of the press and TV documentaries. We say this because, in recent years, not even doctors in advanced study courses came our way. We believe that at least these courses should be resumed."

We support this proposal all the more since the results obtained in this important field confirm the hopes of many patients and specialists.

CSO: 2702/3

ROMANIA

ACTIVITIES FOR EXPLORATION, UTILIZATION OF OUTER SPACE

Bucharest REVISTA ROMANA DE DREPT in Romanian No 8, Aug 82 pp 3-7

[Article by Mircea Dutu: "Considerations Regarding the Principle of the Exploration and Use of Outer Space in the Interest of All Mankind"]

[Excerpts] Since it is fully involved in the process of socioeconomic development, socialist Romania is interested in utilizing the advantages offered for the exploration and utilization of outer space for peaceful purposes, on the basis of the opinion that space technology and research represents the strongest force for innovation and development in our times.

Thus, our country utilizes data obtained by remote terrestrial detection from an airplane or by artificial earth satellites, data in the fields of geology, agriculture and hydrology, for the purpose of determining concrete methods and technologies for progressing gradually to operational systems.

In the field of meteorology, through the use of APT [automatic picture transmission] earth stations, the Institute of Meteorology and Hydrology receives images coming from meteorological satellites of the TIROS-N and Meteor type. The design for an earth station which would receive digital data transmitted in a band of centrimetric waves from a geostationary orbit and from polar orbits is in an advanced stage.

The scientific experiments dealing with the study of outer space deal, mainly, with international collaboration in the framework of the INTERCOSMOS programs.

In the field of space medicine and biology, the research program concentrates on the study of the effects of the modification of the gravitational field (hypogravitation, hypergravitation, and weightlessness).

The program for research and application of space technologies for the 1981-1990 period, an integral part of the policy of our party and state for the introduction of technical progress into the socioeconomic life of the country, includes a number of measures for the exploration and utilization of cosmic space for peaceful purposes.

Giving special attention to international collaboration in the exploration and utilization of outer space and actively promoting the development of this collaboration on equitable bases, with respect for the fundamental principles of contemporary international law, socialist Romania participates as a member in various international organizations such as: the UN Committee on the Peaceful Use of Outer Space; the Committee for Scientific Research, COSPAR; the International Satellite Telecommunications Organization, Intersputnik and the Intercosmos program. Romania has also participated in the preparation of international accords and conventions and has signed agreements and contracts for participation in projects in the area of space or for access to data resulting from space activities.

In this regard, the second United Nations conference on the exploration and utilization of outer space (Vienna, 9-21 August 1982) has been assigned multiple tasks.

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ROMANIA

BRIEFS

OPEN HEART SURGERY--An open heart operation, the first of its kind, was recently performed on a 21-year-old young woman, suffering from the so-called "Bridge syndrome," at the clinic for cardiovascular surgery of the Fundeni Hospital. The operation, performed by a team of specialists headed by Prof Dr Docent Ioan Pop D. Popa, was a success, confirming once again the value of the Romanian school of cardiovascular surgery. In the Fundeni Clinic, which was established 6 years ago, approximately 14,000 operations have been performed, almost one-half of them being heart operations. In an additional 1,045 cases, the operations were for congenital illnesses and about 500 were open heart operations. Some 96.2 percent of the cardiovascular operations have been successful, which places the Romanian clinic on the level of the large prestigious centers in the world. [Text] [Bucharest SCINTEIA in Romanian 25 Dec 82 p 5]

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